and Measured Rate Company #2. Measurements for each ISP were collected during three time periods: 10/25/96-10/28/96, 11/01/96-11/04/96, and 11/06/06-11/09/96. The selected ISP locations are expected to provide a representative sample for the Bell Atlantic region.

1.3. Study Process

The Internet Service Provider (ISP) call traffic study was conducted by monitoring the PSTN's Common Channel Signaling (CCS) network. In particular, the A links for the Class 5 switching end offices serving the studied ISPs were monitored at the STPs serving these offices . By monitoring all SS7 traffic and comparing the called number in the SS7 messages to a list of ISP telephone numbers, Bellcore was able to filter the entire SS7 call record so only ISP calls remained.

1.4. Analyses Conducted

The distribution of call holding times was studied for each of the measured ISPs, and various summary measures were computed. This allowed a comparison of how call holding times vary by pricing plan and by ISP within pricing plan. Detailed results of these analyses are given in Section 2.

A customer-level analysis was also conducted wherein total time on-line was computed for each customer observed during the study period. Comparisons of average time on-line were made by ISP location, pricing plan, and weekend/weekday. Details of these analyses are presented in Section 3.

2. Analyses of Call Holding Times

2.1. Summary Statistics

The table below compares call volumes, customer volumes and average holding times for the ISP sites included in the study.

Call Duration Means (in CCS) and Standard Deviations

	Measured 1	Measured 2	Flat Rate 1	Flat Rate 2	Flat Rate 3
Avg. CCS	**9.20**	**11.44**	15.42	14.26	17.73
Adj. Avg. CCS	**9.54**	**12.55**	16.78	15.04	18.17
Std Dev.	**27.42**	**32.08**	52.32	80.70	59.26
No. Cust.	**18074**	**5079**	28038	2852	7253
No. Calls	**101144**	**34590**	287963	51076	54401

The two measured-rate sites (Measured Rate Company #1 and Measured Rate Company #2) experienced the lowest mean holding times. Averages of the observed call durations are given in the row labeled "Avg. CCS". About .5% of all calls were truncated at study cutoff times. To assess the magnitude of any potential truncation bias, adjusted averages were computed by fitting gamma distributions to the observed data. Note that the differences between the adjusted and unadjusted averages are relatively minor and do not alter the order of the results. Here, as in the remainder of the paper, number of customers refers to the number of customers actually completing calls. No information was available on customers who did not make calls.

2.2. Analysis of Variance

A careful comparison of measured and flat rate plans requires controlling for variations in the data due to other sources. For instance, the holding times can depend on ISP attributes such as the type of browser and content, as well as on the area served by the ISP. These variations can be captured in an aggregate manner as 'within ISP variation' and 'among ISP variation' by decomposing the variations in the data by means of an 'Analysis of Variance' (ANOVA). Therefore, an ANOVA was also conducted to provide an overall comparison of call holding times under flat-rate and measured-rate pricing plans. In our application the ANOVA provides a decomposition of the total variation in holding times into three primary sources:

- Variation due to the rate plan, say factor A
- Variation due to ISP, say factor B (nested under factor A)
- Variation of calls within ISPs, the residual error denoted by factor E

As indicated in the ANOVA table below, both rate plans and ISP locations were highly significant sources of variation, with rate plans accounting for a larger share of variation.

ANOVA[3] Call Holding Times

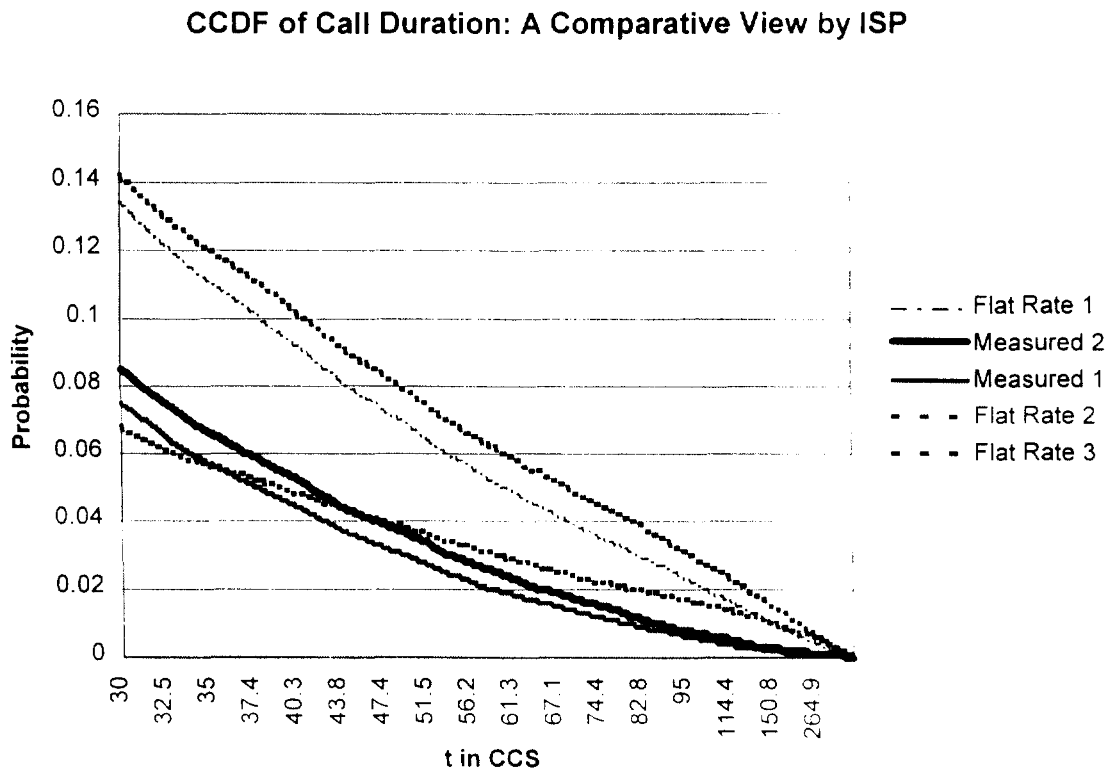
Source	SS (millions)	D.F.	F-value	P-value
Plan, SSA:	4.184	1	1573	0
ISP, SSB(A):	.493	3	61.7	0
Calls, SSE:	1408	529169		

A comparison of holding times indicated that, with high (99%) confidence, the average holding time for flat-rate calls was 6.05 CCS (59%) greater than the average holding time for measured-rate calls.

[3] **Notation**: SS = Sum of Squares and SSA, SSB(A), and SSE for sums of squares due to factors A, B(A), and E ; D.F. = Degrees of Freedom, F-value = the value of the F-Statistic, and P-value = the tail probability of F-distribution from the observed F-value.

2.3. Holding Time Distributions

The chart and table below compare the Complementary Cumulative Distribution Functions (CCDFs) for the studied ISP locations. The chart plots holding time in CCS (horizontal axis) versus the proportion of calls whose holding times equal or exceed a given duration (vertical axis). For example, the height of a CCDF curve at t = 30 represents the fraction of calls which are longer than 30 CCS. This chart is intended to provide a visualization of which ISP locations tend to have longer calls and which tend to have shorter calls. In a CCDF chart of a duration distribution, thicker tails correspond to longer durations. Shown in the table below is the tail areas of the CCDFs of the five rate plans.



It is clear from this chart that measured rate plans have a smaller fraction of longer calls. As further illustration, the following table was abstracted from the data used to generate the above chart and the data on shorter calls. It shows that the measured rate sites (Measured Rate Company #1 and Measured Rate Company #2) received smaller fractions of longer calls and larger fractions of shorter calls.

Fraction of Calls Longer than t CCS

CCS	Measured 1	Measured 2	Flat Rate 1	Flat Rate 2	Flat Rate 3
t = 5	0.365	0.474	0.411	0.259	0.436
t = 10	0.241	0.304	0.312	0.179	0.334
t = 50	**0.029**	**0.035**	0.068	0.037	0.078
t = 100	**0.006**	**0.007**	0.021	0.016	0.028

Separate analyses of holding times were conducted for ***short*** (no more than 5 CCS), ***medium*** (between 5 and 40 CCS) and ***long*** (no less than 40 CCS) calls. The results of those analyses are indicated in the table below:

HT Statistics by Type of Calls and by Measured (M) and Flat (F) Rate Pricing Plans

Type	% calls-M	% Calls-F	Avg. HT-M	vg. HT-F	95% CI for increased CCS
Short	**60.7%**	**60.5%**	1.54	1.10	[-.447,-.426]
Medium	34.6%	30.6%	14.96	16.88	[1.81, 2.04]
Long	**4.7%**	**8.9%**	81.41	107.02	[21.23,29.99]

Note that the percent of short calls is about the same for both pricing plans. The data suggest that under flat-rate plans, about 4% of calls shift from the medium category to the long category. While short flat-rate calls tend to be shorter on average than short measured-rate calls, the reverse is true for medium and long calls. These differences are quantified via 95% confidence intervals. For example, we are 95% confident that long flat-rate calls average ***at least*** 21.23 CCS longer than measured-rate calls and ***at most*** 29.99 CCS longer than long measured-rate calls.

3. Analyses of Customer Usage

The customer usage (total holding time per customer) of a service during a certain period of interest depends on the number of calls made during the period as well as the duration of each call. In the previous section we studied how the average holding time of a call vary according to the rate plan. It can be expected that the number of calls made by a customer, say during a month, also vary with the rate plan. Therefore, the objective of this section is to study and quantify the total effect (in terms of total holding time) due to both of these factors.

3.1. Overall Summary

An overall summary of customer usage was prepared by computing total on-line time for each customer accessing a given ISP location during the study period. Thus total on-line time represents the sum of all holding times for calls initiated and terminated (or truncated) during the study period. The table below gives the average on-line time in CCS for customers at each of the studied ISP locations[4]. Number of customers refers to the number of customers who made at least one call during the study period. No reliable information was available about customers who did not make calls.

Customer Usage (Total HT per Customer) During Trial Period

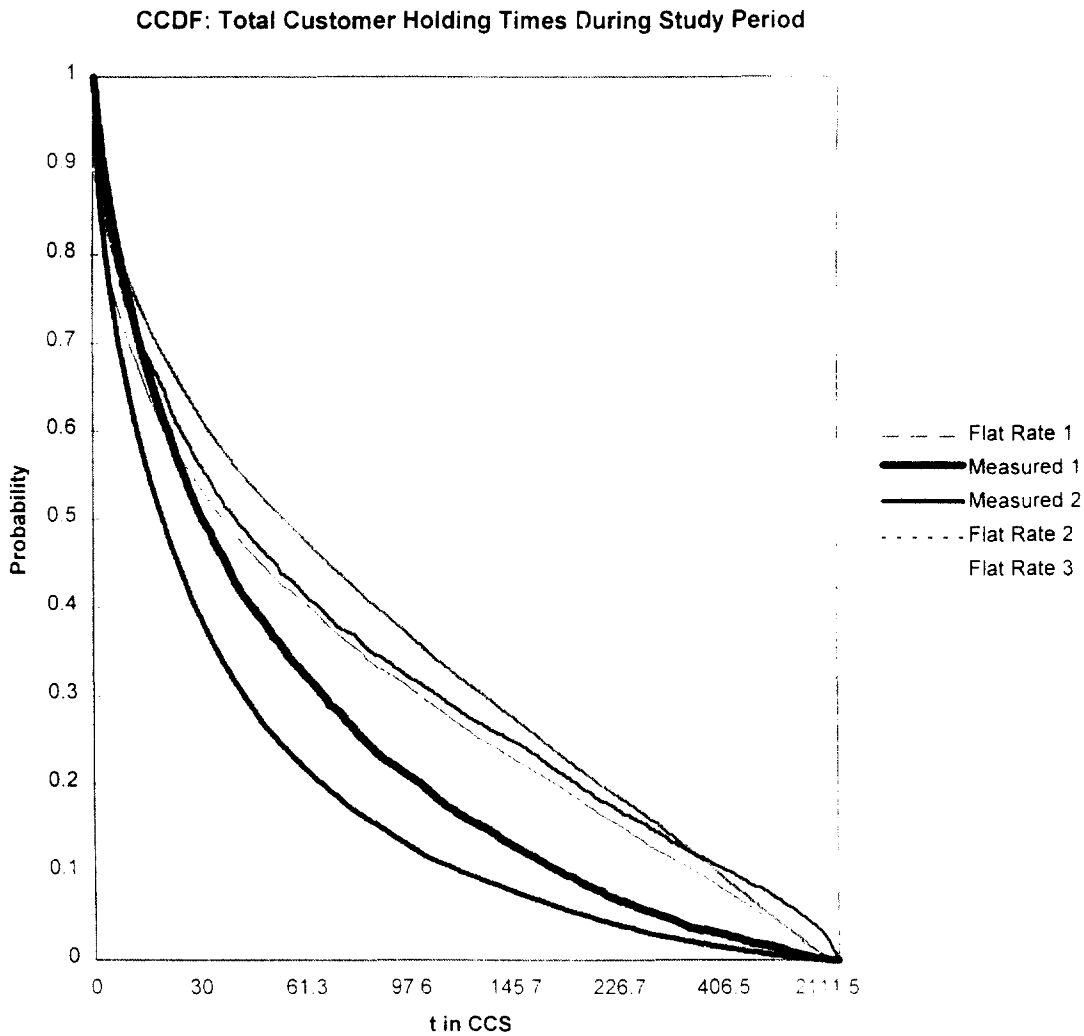
	Measured 1	Measured 2	Flat Rate 1	Flat Rate 2	Flat Rate 3
Avg. CCS	**51.4**	**77.9**	158.3	217.7	134.1
Std Dev.	**117.3**	**159.1**	324.3	599.3	291
No. Cust.	**18074**	**5079**	28038	2852	7253

Note that customers of ISP locations with measured-rate pricing had, on average, shorter total on-line times than their counterparts with flat-rate pricing.

3.2. Total Customer Holding Time Distributions

The chart below compares the Complementary Cumulative Distribution Functions (CCDFs) for the studied ISP locations. The chart plots holding time in CCS (horizontal axis) versus the proportion of customers whose total holding times equal or exceed each holding time (vertical axis). This chart is intended to provide a visualization of which ISP locations tend to have longer total customer holding times and which tend to have shorter total holding times.

[4] The figures for Flat Rate Company #3 are based on the last two measurement periods only.



3.3. Total Customer Holding Time per Day

This subsection examines how total customer holding time varies by weekday and by weekend day. A customer's weekday average is computed by summing the holding times of all calls to a given ISP location which originated during weekdays and dividing by the number of weekdays the ISP was measured. Weekend day averages are computed analogously. Averages over all customers who made calls are given in the tables below.

Customer Usage (Total HT) Per Weekday

	Measured 1	Measured 2	Flat Rate 1	Flat Rate 2	Flat Rate 3
Avg. CCS	**5.12**	**9.74**	21.66	25.96	24.33
Std Dev.	**10.41**	**16.68**	43.86	71.24	51.93

Customer Usage (Total HT) Per Weekend Day

	Measured 1	Measured 2	Flat Rate 1	Flat Rate 2	Flat Rate 3
Avg. CCS	**10.15**	**12.72**	20.88	38.72	32.36
Std Dev.	**22.33**	**27.79**	42.86	100.92	61.27

The above tables indicate that average holding times at flat-rate ISP locations exceeded those at measured-rate locations.

3.4 Analysis of Variance

Analyses of variance were conducted for customer holding times for both weekdays and weekend days. The results are displayed in the tables that follow.

ANOVA Total Customer Usage Per Weekday

Variation Source	SS (millions)	D.F.	F-value	P-value
Plan, SSA:	2.815	1	1759	0
ISP, SSB(A):	.1324	3	27.57	0
Customers, SSE:	78.84	49263		

ANOVA[5] Total Customer Usage Per Weekend Day

Variation Source	SS (millions)	D.F.	F-value	P-value
Plan, SSA:	1.846	1	976	0
ISP, SSB(A):	.9228	3	163	0
Customers, SSE:	81.43	43075		

The ANOVA results show that variations due to price plan and ISP location are both highly significant, but that pricing plans account for greater variation than ISP locations. Further analysis indicated that with high (99%) confidence, the mean customer holding time per weekday under flat-rate plans exceeded the mean holding time under measured-rate plans by 15.2 CCS, a 240% increase. For weekend days, the difference was 12.3 CCS or 115%.

[5] **Notation**: SS = Sum of Squares and SSA, SSB(A), and SSE for sums of squares due to factors A, B(A), and E ; D.F. = Degrees of Freedom, F-value = the value of the F-Statistic, and P-value = the tail probability of F-distribution from the observed F-value.

4. Conclusions

This report presents the results of a statistical analysis of Internet usage, the purpose of which was to determine the differential impact of two major Internet Service Provider (ISP) pricing plans (i.e., flat-rate vs. measured-rate) on call holding times and on total customer on-line times.

Analyses of individual call holding times revealed the following:

- Under flat-rate pricing, call holding time averaged 6.05 CCS (59%) greater than under usage-sensitive pricing.
- The increased average holding time under flat-rate pricing appeared to result from a shift of medium-length calls (5-40 CCS) to longer calls (40+ CCS).
- ISP locations with flat rate pricing had greater average holding times than ISPs with measured-rate pricing.
- Variation between pricing plans was greater than variation between ISP locations.

Analyses of total customer on-line times revealed the following:

- Under flat-rate pricing, average weekday usage per customer was 15.2 CCS (240%) greater than under measured-rate pricing.
- Under flat-rate pricing, average weekend day usage per customer was 12.3 CCS (115%) greater than under measured-rate pricing.
- ISP locations with flat-rate plans had a greater fraction of long total customer holding times than did ISP locations with measured-rate plans.
- ISP locations with flat-rate pricing had greater average daily usage per customer than ISP locations with measured-rate pricing.
- Average daily usage per customer was greater on weekends than on weekdays.
- Variation between pricing plans was greater than variation between ISP locations

ATTACHMENT B

RESPONSE TO THE ETI STUDY

The Internet Access Coalition attached to its comments in the rulemaking portion of this proceeding an analysis prepared by Economics and Technology, Inc. ("ETI") of the reports on the network impact of Internet traffic filed by the RBOCs with the Commission during 1996.[1] That study included conclusions and arguments which in many respects are incorrect and misleading. Following are responses to some of the key issues addressed.

Contrary to ETI Claims, Revenues from Increased Internet Traffic Are Far Below The Costs Of Accommodating That Traffic.

ETI's study referred to all BOC data services, not just those used for Internet access. Bell Atlantic and NYNEX are experiencing significant increases in demand for their fast packet services. These services are used predominantly by large business customers for high-speed data traffic, and there is no question that these services produce revenues which cover costs. By making conclusions based on all data services in its analysis, however, ETI's results have no relevance to the question of whether rates charged for Internet traffic are compensatory, which is the only issue before the Commission.

As indicated in Bell Atlantic's June 28, 1996 report to the FCC, the traffic-sensitive costs for line side connections are approximately $75 per month per DS-0 equivalent versus revenue of about $20. Costs for trunk side connections are approximately $50 per month per DS-0 equivalent versus revenue of about $23. These below cost pricing signals cause ISPs to continue to buy circuit-switched services, and Bell Atlantic and NYNEX must invest hundreds of millions of dollars to build out capacity to serve their traffic. ISPs are also investing in additional modems that can be used only with circuit-switched technology, not more efficient packet-switched services. Therefore, ISP investments are simply perpetuating the expansion of old technology.

ETI Has Distorted Bell Atlantic's Statistics To Support Its Claim That There Are Few Heavy Traffic Loads.

Bell Atlantic's June 28, 1996 report to the Commission (page 5) explained that the figures presented were taken from a sample of offices, not a comprehensive census. ETI, however, divides the traffic increases in the sample offices to the total traffic in all offices and

[1] See, Economics and Technology, Inc., "*The Effect of Internet Use on the Nation's Telephone Network*," (Jan. 22, 1997), filed as an attachment to the Comments of Internet Access Coalition (filed Jan. 29, 1997).

claims that the increase in overall traffic is minimal. That technique, of course, produces an artificially low number, but it has no probative value. As discussed in the main pleading, the traffic loads in affected offices are already large. For example, Bell Atlantic estimates that ISPs will generate 25 billion minutes throughout its network during 1997. Moreover, at the growth rates of Internet traffic currently being experienced, ISP traffic is expected to equal the entire originating and terminating switched access minutes for all interexchange carriers within a few years.

In addition, Bell Atlantic has recently conducted a traffic study involving all two hundred offices in New Jersey. Of the two hundred offices, sixty (30%) have experienced congestion of varying degrees that required emergency investment to alleviate. To relieve this congestion, Bell Atlantic has recently had to install 9,144 new trunks and is planning to install an additional 20,927 trunks throughout this year to help accommodate Internet traffic.

The following chart shows information regarding seven New Jersey inter-office trunk groups over which traffic to and from various ISPs is transported, because they connect offices which serve various ISPs. The offices named are those that the trunk groups connect. BH represents the busy hour, TIS represents the number of trunks in service, and REQ represents the number of trunks required to address congestion experienced in those trunk groups and to maintain service quality for all telephone users. The Additions column represents the number of trunks that have been added or will be added to accommodate the increased traffic to which the ISPs are contributing and the date of that installation. Based on the timing of the increases in relation to ISP activity and on historical growth information, it can reasonably be assumed that this increase is attributed primarily to Internet usage.[2]

		February 1996			February 1997			
		BH	TIS	REQ	BH	TIS	REQ	Additions
Cranford	Unionville	4PM	96	63	7PM	96	120	48 (3/97)
Cranford	Millburn	4PM	48	37	9PM	71	47	24 (1/97)
Englishtown	Freehold	4PM	168	165	8PM	264	242	96 (12/96)
Eatontown	Neptune	2PM	96	90	8PM	192	118	96 (2/97)
Edison	Metuchen	4PM	216	207	7PM	264	207	48 2/97
Fair Lawn	Hackensack	4PM	144	143	8PM	216	230	72 (1/97) 96 (3/97
Hackensack	Passaic	4PM	192	144	9PM	264	282	72 (2/97) 24 (3/97)

[2] For example, the Fairlawn to Hackensack group was sized at 144 trunks in 1991. Since that time there had been no need to add trunks to this group until January 1997 when 72 trunks were added. 96 more trunks are being added in March 1997. Therefore, in three months, the growth of Internet traffic has forced Bell Atlantic to more than double the size of this trunk group.

ETI Falsely Claims that Bell Atlantic's Internet Operations Add To The Congestion.

Bell Atlantic's Internet access provider, Bell Atlantic Internet Solutions, has chosen to use Internet Protocol Routing Service (IPRS) rather than the public switched network as its delivery vehicle. As described in Attachment E, IPRS is a packet-switched service that bypasses the interoffice trunks and the ISP's serving central office switch, thereby minimizing network congestion. If other ISPs were to use this technology, congestion would be significantly reduced.

Contrary to ETI's Claim, Bell Atlantic and NYNEX Are Not Seeking To Impose Existing Access Charges on ISPs.

ETI references page 17 of Bell Atlantic's June 28th report to the Commission to substantiate this claim. However, ETI ignores the following language on that page:

"A usage sensitive price (related to the traffic sensitive costs in our local network) is needed to send the appropriate signal to use the public switched telephone network efficiently. However, we recognize that this price must be at a level which does not cause disruption in the industry. As stated at the outset of this report, Bell Atlantic will work with the Commission and the industry participants to come up with pricing options that help to moderate existing cross subsidies, and help send the type of economic signal that will aid in allowing the faster adaptation of technologies which will help alleviate growing congestion on the local telephone network, but which will also not lead to undue disruption in the industry."

Bell Atlantic and NYNEX have not advocated and are not advocating applying access charges at the current levels on ISPs, even for an interim period.

Contrary to ETI's Claim, ISP Usage Characteristic Are Not Like Those Of End Users.

Bell Atlantic's June 28 report included traffic studies of 16 business customers with large multiline hunt group arrangements like those used by many ISPs and found that traffic levels were generally half of the levels generated by ISPs. In addition, the vast majority of business end user customers generate substantial revenues from message units and toll revenue associated with originating calling and from purchase of vertical features. By contrast, most ISP traffic is terminating, which produces no revenues, and ISPs buy no vertical features. While niche segments exist that also generate large inbound calling volumes (e.g. pizza delivery services), these segments are relatively small and their demand is relatively constant. By contrast, ISP traffic is growing at least 100% per year and directly forcing the investment of hundreds of millions of dollars in otherwise unnecessary plant.

<u>ETI Is Wrong When It Claims That The Incremental Costs To Serve ISPs Are Low Because ISP Traffic Is Highest During Off-Peak Hours</u>.

Internet traffic is so substantial that it has created a new peak. Although Internet traffic is relatively low during the traditional busy hour Internet usage has actually changed traditional usage patterns so substantially that it has created a *second* daily peak period. Traditionally telephone usage is heaviest (peaks) between 4 and 5 p.m. on weekdays. Because most consumer Internet users "go on-line" in the evenings, Bell Atlantic's network is experiencing a second peak period (7 p.m.) each day. The impact of phenomenon is an increase in call holding times from an average of five minutes per hour to 45-50 minutes per hour. It is this 10-fold increase in holding times that impact incremental costs.

<u>The Facts Belie ETI's Claim That the LECs Will Not Use Additional Revenue To Invest In New Data Technology</u>.

ETI asserts that LECs will simply use any additional charges to add to their profits. ETI is wrong. Bell Atlantic and NYNEX are not covering the costs spent to provide service to ISPs today. Charging ISPs a compensatory rate would simply allow the service to cover costs, not add "profits." In addition, a usage charge which correctly reflects the cost of a circuit-switched network would give ISPs an economic incentive to order packet-based services (e.g. IPRS and IPAS), which is the superior technology for data traffic and which Bell Atlantic and NYNEX are already deploying. If they decide the remain on the circuit-switched network, the ISPs would at least compensate the LECs for the costs of serving them.

<u>Contrary To ETI's Claims, Trunk Side Connections Are Properly Priced</u>.

ETI argues that line side connections configured in multi-line hunt groups are usually priced lower than trunk side ISDN connections, even though ISDN connections would relieve switch congestion. As ETI has stated, however, trunk connections are non-blocking in the final switch, thus representing a higher grade of service. Analog service arrangements have concentration ratios, usually in the range of 8:1, unlike trunk connections. If the price of an analog line is adjusted to equate to the 1:1 concentration ratio of a trunk, the prices prove to be in line. More ISPs are beginning to understand the value of trunk side connections to their grade of service. As a result, demand for trunk side connections in the Bell Atlantic region now exceeds the demand for line side connections.

<u>Contrary to ETI's Claims, Congestion In The Internet Itself Adds To Network Congestion</u>.

Congestion on the Internet backbone contributes to public switched network congestion in two ways. First, when ISPs do not adequately size their modem pools, Internet users have to redial the ISPs access number repeatedly until they get a connection to the ISP's network. This increases holding times and associated switch and trunk costs. The much-publicized problems of some large ESPs that also provide Internet access shows that this is not just a hypothetical situation. With flat-rated pricing, once they connect, end users are apt to stay connected for an extended period, even when they are not using their computer, to avoid having to contend for an open modem port later.

Second, congestion in the Internet backbone itself, coupled with the multimedia nature of the Internet, contribute to network congestion. For example, Web pages, the fastest growing Internet applications, are rich in color and sound and in some cases have video and voice communications capabilities. These high-bitrate features take a considerable time to download through 28.8 kbps or lower speed modems over narrowband, analog lines. With so much data flowing over the Internet, the backbone itself also slows the process. Therefore, users experience slow response times. All this increases holding times the time that a user connects to the ISP, and adds to the network congestion.

ATTACHMENT C

ATTACHMENT C

A REPORT TO THE STATE CORPORATION COMMISSION REGARDING RECENT NETWORK BLOCKAGE

In January 1997, Bell Atlantic experienced unexpected and severe blockage in its voice network in various parts of its service region. This report is an explanation of blockages in the Richmond and Norfolk LATAs. Since Bell Atlantic's networks are designed to meet average loads, some occasional blockage is expected. However, the blockage is usually of short duration and affects only a small percentage of total calls being processed. The blockages that occurred in early January were much longer in duration and a high percentage of customers were affected.

What Happened

In late1996 several Internet Service Providers, (ISP), began offering flat rate service to their customers in lieu of the traditional measured rate service. One of the largest, America On Line, began offering this service in December. There has been much publicity in the media about the response to this offering and the ISP's inability to meet the demand. Customers with flat rate Internet service tend to use the service much longer than those with measured service. An analogy would be of a long distance phone company that started offering flat rate service. Naturally, customers would talk to family and friends much longer, without regard for the length and thus cost of the call.

The ISPs that offered flat rate service were overwhelmed with customer acceptance and their ability to provide service was diminished as customers who might have used a few minutes of access, began staying connected much longer. Since those customers use our voice network to connect to the ISPs, the negative impact also affected Bell Atlantic's network. Our networks are designed based on the average volume of calls and length of calls. The affect on Bell Atlantic's network in Richmond came from an increase in the length of the calls. Bell Atlantic designs its network with direct trunk groups to each connecting office. In order to handle surges in traffic it also has a tandem network and switch designed to complete calls that might overflow the normal trunk group. (See Figure 1 on the following page). The tandem is the last line of defense in completing calls during peak calling times. An example of the impact can be seen in the America On Line location in the Grace Street 5E. The customer has a 144 line hunt group and the holding time on the trunk group from the Richmond Tandem to the Grace Street 5E increased by nearly 400% during this period as shown in the following table. Since this holding time increase is an average of all calls, the increase for ISP calls would be even longer.

Busy Hour Data

	Grace Street Tandem To Grace Street 5E	
	% Overflow	Holding Time in Minutes
Monday 12/16	14	1.95
Friday 12/20	0	1.85
Monday 12/30	0	2.05
Friday 1/3	0	1.80
Monday 1/6	38	9.72
Tuesday 1/7	22	8.67
Wednesday 1/8	52	6.35
Thursday 1/9	32	14.93
Friday 1/10	33	2.78
Monday 1/13	1	4.95

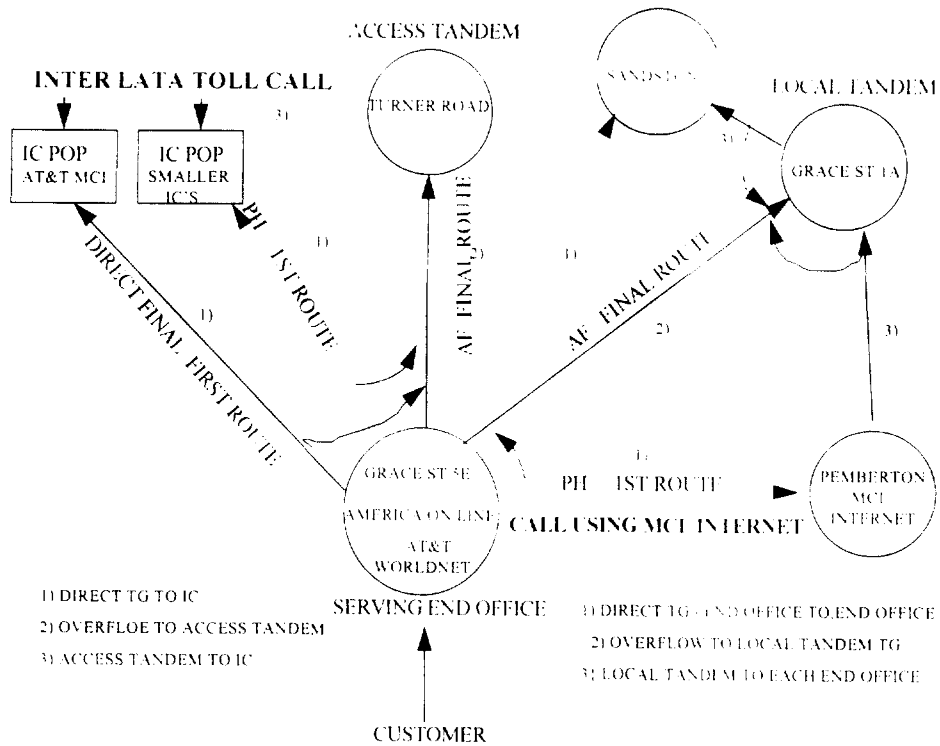
While holding time for our tandem trunk groups average 3.5 minutes per call, the holding time for ISPs is significantly higher, an average of 22 minutes per call. A sample of the ranges is shown below:

Sample Holding Times for 1/27/97

	Holding Time In Minutes
Bell Atlantic Bute Street Tandem (960 Trunks)	3.5
America On Line (414 Terminals)	25.3
ATT (120 Terminals)	24.2
Sprint (116 Terminals)	18.5
Widowmaker (168 Terminals)	17.6
Erols (551 trunks)	29.1

ATTACHMENT C

RICHMOND TRUNK NETWORK EXAMPLE



How Did We Identify The Problem?

Bell Atlantic continuously monitors its network looking for equipment troubles and overloads. January 6th, was the first full business day in the first full business week in 1997. The highest traffic volumes of the day occurs from 4:00 - 5:00 PM. It now appears that an increased traffic load from our customers calling the ISPs had developed during the holiday season. This growth in traffic was not immediately obvious because business generated call volumes declined during the Christmas holiday season. However, on January 6th the full impact of the business community returning to its normal pace and the increase ISP load came together for the first time. The tandem offices in both Norfolk and Richmond went into heavy overload during the busy period. Responding to internal alarms as well as customer reaction, Bell Atlantic began to analyze the source of the traffic load and to create an action plan to increase trunk groups to accommodate the increased load. During the following few days large quantities of trunks were installed and by Jan 13th, the network was again sized to handle the increased load in Richmond. In Norfolk, the tandem trunk group serving the America On Line CO was increased by 340 trunks from the original size of 720. Even with that increase of facilities some blockage still is experienced during the busy hour. This situation will not be totally cleared up until Lucent Technologies completes a hardware growth job scheduled to complete February 23.

What Are We Doing To Fix These Problems

By the end of January, Bell Atlantic had added 1,848 trunks in the Richmond and Norfolk LATA. An additional 2,400 trunks are needed and will be installed as quickly as our hardware vendors can install the necessary equipment in the Central Offices. The cost of adding these new facilities and associated hardware will be $3,325,000.

The problems experienced in Richmond and Norfolk are similar to Bell Atlantic's experience in other areas of its service region. In an effort to react quickly to problems of this type, the Central Office Engineering department has created a "War Room" to deal with these high profile issues. The purpose of the War Room Team is to react to unexpected overloads on the telephone message network, and to plan long term solutions, such as network routing changes, equipment additions, and Internet Protocol Routing Service (IPRS) routing for Internet providers.

Requests have been processed for some emergency additions to Grace St. 5E, Grace St. 1A, and Bute St. 5E. There is an equipment job out to add 960 trunks in Grace St. 5E, where AT&T WorldNet and America On Line are served. There are also jobs pending for the Bethia, Pemberton, Hungary Springs, Grace St. DMS, Petersburg 1A, Aberdeen Rd, Brickell Rd, Bute St DS1, Bute St. 5E, Chinese Corner, Churchland, Guerriere, Huntington, Indian Lakes, Indian River, Sewells Pt., and Virginia Beach 32nd

St. switches. Most are due in late February. As soon as we are able we will augment trunks in those switches as required.

A task force has been established to interface with Lucent Technologies to complete their equipment additions prior to the established due dates. There has been a problem getting equipment from Lucent, even after the equipment jobs have been written, due to a shortage of Central Office equipment. This shortage has been caused by the growth of ISDN, both Primary Rate Interface (PRI) and Basic Rate Interface (BRI). ISDN is becoming the technology of choice both in business applications and by the Internet providers and users. We have asked that additional switch mods be ordered for message trunks when orders are processed for PRI's for internet providers.

Two attachments follow. The first is a current list of Internet providers in Bell Atlantic's service area, listed by central office location. The second is a copy of a report that Bell Atlantic provided to the Federal Communications Commission earlier in 1996. It describes the issues surrounding Internet Service Providers and Bell Atlantic's position on these issues.

ATTACHMENT D

NYNEX Government Affairs
1300 I Street NW Suite 400 West Washington DC 20005
202-336-7891

Kenneth Rust
Director
Federal Regulatory Matters

ATTACHMENT D

NYNEX

July 10, 1996

James Schlichting
Chief, Competitive Pricing Division
Federal Communications Commission
Room 518
1919 M Street, NW
Washington, DC 20554

Mr. Schlichting:

This letter is in response to several requests we have had from Common Carrier Bureau staff for information regarding potential traffic capacity problems arising from the ESP exemption. As you know, the ESP exemption was crafted some years ago to aid the fledgling information services industry, and there is increasing concern being expressed that this now robust and rapidly growing market segment will pose a severe capacity problem for a network designed and engineered to accommodate "traditional" traffic patterns. As the data supplied on the attached pages show, calls involving information service providers (ISPs) involve higher occupancy rates and are of much longer duration than traditional traffic.

ISPs gain access to their customer base via dial-up connections purchased from local exchange companies through local service tariffs, instead of purchasing access as other carriers must do. Because of this exemption from the requirement to purchase access, which has traditionally been priced well above cost to provide a subsidy for local service, end users in most cases dial a local telephone number to reach the ISP of their choice. ISP's purchase their local dial tone lines in multi-line hunt groups, and they terminate these lines in analog modem pools. The calls received by the ISP are aggregated, "packetized," and transported using private line facilities to an Internet hub.

NYNEX data for year-end 1995 identified approximately 200 companies using this configuration in its serving area. These companies were managing a minimum of 500 separate locations and utilizing approximately 50,000 business line terminations. NYNEX's current data show that the number of businesses and lines using this configuration is *increasing about 10% per month*.

It is important to note that dial-up connections for this traffic require dedicated links through the switch and network for the duration of the call. As the data on the accompanying pages show, the traffic characteristics of the ISP calls differ significantly from traditional voice traffic, and as a result this incremental demand is already beginning to impact the quality of voice telephone service to some degree, and the rapid expansion of such traffic suggested by the explosive growth in lines portends dire consequences for network access.

NYNEX has been gathering Internet usage data on a regular basis. Attachment #1 provides a representative cross section of five Internet providers of varying size offering service from offices that are predominantly business or residential, or mixed. The data are similar across NYNEX.

The major success factors for the ISP in this market would appear to be retail price, network accessibility by the end user, and the quality of support offered to the end user by the ISP.

The traffic usage data included on the attachments identifies the size of the ISP (# of lines), the ISP's offered price for Internet access, the volume of calls the ISP received (attempts), the number of calls that were blocked (overflow) and the length of time the call to the ISP was connected (holding time). The key factors impacting the telephone network are call volume (attempts), call duration (holding time) and CCS/line, i.e., the number of minutes the lines were in use. Occupancy, or minutes of use, is measured in hundred call seconds (CCS) or seconds of use divided by 3600 for the (1) hour period.

Our analysis of the data identifies holding times of 20 to 40 minutes for this type of traffic, compared to 5 to 10 minutes for voice traffic, and it further shows that *the holding time for the ISP traffic is correlated strongly to price structure*. It should also be noted that these data do not reflect the recent change in consumer pricing from usage sensitive to flat rate now offered by major long distance carriers. Moreover, the CCS or occupancy data indicate that this traffic is *incremental* to normal voice traffic, not complimentary. Occupancy levels in excess of 20 CCS per hour are realized in most cases by 10:00 AM, and this load is sustained throughout the day and evening and beyond midnight. Switches are engineered based upon peak loads occurring at single hours consistent with traditional office load traffic characteristics and call duration.

If you require additional information, or care to discuss the implications of these findings in more detail, please feel free to call me.

Yours truly,

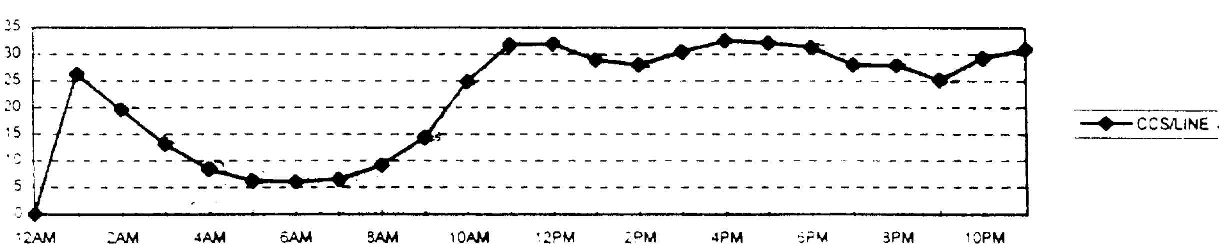
Attachments

W18th St. 5ESS DS0 — Data for Tuesday February 6, 1996

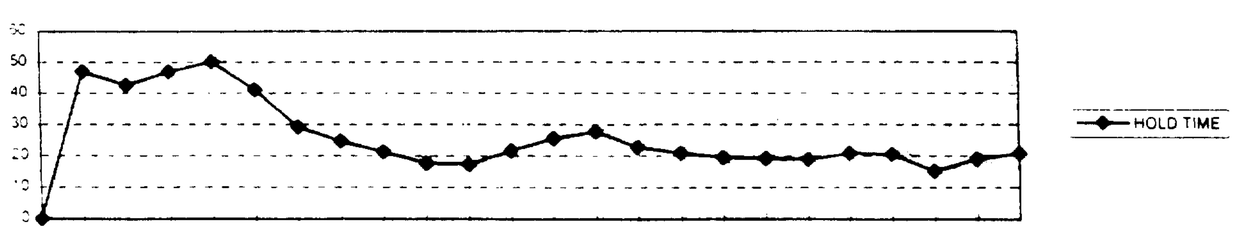
303 Line MLHG (28.8/14.4)

HOURS	CALL ATTEMPTS	OVERFLOW	USAGE	CCS/LINE	HOLD TIME (min)	
12AM	n/a	n/a	n/a	n/a	n/a	
1AM	282	0	7,955	26	47	
2AM	232	0	5,942	20	43	
3AM	142	0	4,009	13	47	
4AM	85	0	2,559	8	50	
5AM	76	0	1,875	6	41	
6AM	105	0	1,841	6	29	
7AM	134	0	1,985	7	25	
8AM	218	0	2,795	9	21	
9AM	411	0	4,344	14	18	
10AM	723	0	7,533	25	17	
11AM	739	0	9,638	32	22	
12PM	629	0	9,677	32	26	
1PM	525	0	8,760	29	28	
2PM	622	0	8,492	28	23	
3PM	735	0	9,236	30	21	
4PM	836	0	9,847	32	20	
5PM	839	0	9,725	32	19	
6PM	835	0	9,489	31	19	
7PM	679	0	8,505	28	21	
8PM	685	0	8,474	28	21	
9PM	836	0	7,629	25	15	
10PM	773	0	8,889	29	19	
11PM	748	0	9,400	31	21	$25.00/mo 1st 60 hrs
Total	**11,889**	**0**	**158,599**	**23**	**22**	

CCS/LINE



HOLD TIME (min)



W18th St. 5ESS DS0 | Data for Friday, February 16, 1996

110 Line MLHG (28.8)

HOURS	CALL ATTEMPTS	OVERFLOW	USAGE	CCS/LINE	HOLD TIME (min)	
12AM	238	0	3,714	34	26	
1AM	144	0	3,493	32	40	
2AM	71	0	2,915	27	68	
3AM	40	0	2,244	20	94	
4AM	56	0	1,861	17	55	
5AM	27	0	1,802	16	111	
6AM	30	0	1,710	16	95	
7AM	49	0	1,694	15	58	
8AM	107	0	2,404	22	37	
9AM	126	0	2,834	26	37	
10AM	703	452	3,785	34	44	
11AM	1,682	1,117	3,949	36	39	
12PM	1,690	1,292	3,955	36	68	
1PM	1,708	1,273	3,958	36	80	
2PM	979	635	3,954	36	45	
3PM	1,173	805	3,958	36	53	
4PM	1,242	912	3,938	36	42	
5PM	554	341	3,930	36	45	
6PM	1,189	821	3,948	36	42	
7PM	858	517	3,919	36	28	
8PM	345	158	3,873	35	41	
9PM	347	164	3,877	35	42	
10PM	314	165	3,904	35	58	$10.00/mo unlim hrs
11PM	215	64	3,815	35	45	
Total	**13,887**	**8,716**	**79,434**	**30**	**44**